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Supplementary Material

2 **Table S1.** The iron content of the PUT, RN, and SN from the k-space cropped lower resolution images
 3 were correlated with the iron content of the original images. The values of all the slopes and R^2 are
 4 given in Table S1. The R^2 values are all close to unity indicating a very good agreement between the
 5 measurements.

	Right side						Left side					
	Site 1		Site 2		Site 3		Site 1		Site 2		Site 3	
	slope	R^2	slope	R^2	slope	R^2	slope	R^2	slope	R^2	slope	R^2
PUT	1.01	0.99	0.95	0.99	0.98	0.99	0.99	0.99	0.94	0.99	0.99	0.99
RN	0.97	0.99	0.97	0.99	1	0.98	1	0.98	1.01	0.99	1.06	0.98
SN	0.97	0.99	0.93	0.99	1.02	0.98	0.99	0.98	0.99	0.99	1.02	0.98

6 PUT (Putamen), RN (Red Nucleus), and SN (Substantia Nigra).

7 **Table S2.** Mean susceptibility (ppb), standard deviation and standard error of the different DGM in
 8 subjects (age range 55-65 years) from 3 sites. The means in this age range are similar to each other for
 9 all three sites across all the structures. It should be noted that the age ranges for each site are different
 10 and narrow age ranges will lead to larger errors in the slope. When merged together into a single large
 11 data set, the slopes are much more accurately determined.

		RII analysis			Global analysis		
		mean	std devn*	std error	mean	std devn	std error
CN	Site 1	95.99	7.79	1.25	46.16	10.92	1.75
	Site 2	98.93	10.02	0.72	45.74	12.87	0.92
	Site 3	99.23	8.32	1.25	44.27	9.66	1.46
GP	Site 1	236.76	24.91	4.04	134.18	23.98	3.84
	Site 2	229.52	21.6	1.69	115.46	24.13	1.77
	Site 3	240.98	23.47	3.67	128.93	21.16	3.25
PUT	Site 1	142.35	14.04	2.25	74.16	18.74	3.02
	Site 2	133.46	11.58	0.84	53.2	18.04	1.3
	Site 3	133.17	11.94	1.8	50.26	13.41	2.02
THA	Site 1	29.37	7.13	1.14	-0.06	6.89	1.1
	Site 2	27	7.91	0.57	-10.07	7.46	0.53
	Site 3	27.89	7.76	1.17	-8.57	6.64	1
PT	Site 1	81.01	6.99	1.15	43.67	14.62	2.34
	Site 2	82.9	7.96	0.71	33.04	18.61	1.33
	Site 3	81.65	8.11	1.42	36.68	16.13	2.44
RN	Site 1	175.47	13.86	2.57	90.2	30.97	4.96
	Site 2	175.23	12.31	0.93	110.47	32.97	2.35
	Site 3	176.92	15.88	2.45	123.42	33.61	5.07
SN	Site 1	197.29	14.71	2.42	105.84	30.21	4.84
	Site 2	204.28	15.42	1.12	130.08	30.28	2.17
	Site 3	206.2	16.99	2.56	134.85	28.05	4.25
DN	Site 1	148.96	13.48	3.09	48.53	29.62	5.08
	Site 2	156.97	15.74	1.15	102.54	28.2	2.04
	Site 3	153.72	11.88	1.81	100.33	24.02	3.62

12 CN (Caudate Nucleus), GP (Globus Pallidus), PUT (Putamen), THA (Thalamus), PT (Pulvinar
 13 Thalamus), RN (Red Nucleus), SN (Substantia Nigra), DN (Dentate Nucleus), and ppb (parts per
 14 billion) unit.

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17 **Table S3.** Linear fitting equations for mean susceptibility (χ) (ppb) versus age for the global analysis.

	$\chi=A \times \text{age}+B$	Error in A (ppb/year)	Error in B (ppb)	<i>r</i>	<i>r</i> -CI	<i>p</i> - value
CN	$\chi=0.37 \times \text{age}+22$	0.07	4.02	0.39	(0.33,0.46)	<0.001
GP	$\chi=-0.05 \times \text{age}+124$	0.15	8.75	-0.03	(-0.11,0.05)	0.49
PUT	$\chi=0.51 \times \text{age}+25$	0.11	6.29	0.35	(0.28,0.42)	<0.001
THA	$\chi=-0.42 \times \text{age}+17$	0.04	2.56	-0.60	(-0.65,-0.55)	<0.001
PT	$\chi=-0.15 \times \text{age}+44$	0.11	6.30	-0.11	(-0.19,-0.03)	<0.01
RN	$\chi=1.41 \times \text{age}+23$	0.20	11.56	0.49	(0.43,0.55)	<0.001
SN	$\chi=0.92 \times \text{age}+71$	0.19	10.91	0.37	(0.29,0.43)	<0.001
DN	$\chi=1.4 \times \text{age}+9$	0.22	13.12	0.47	(0.4,0.53)	<0.001

18 *r*: Pearson correlation coefficient; *r*-CI: Confidence interval of *r*

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20 **Table S4.** Linear fitting equations for global nuclei volume (V) (mm³) vs age.

	V=A×age+B	Error in A (mm³/year)	Error in B (mm³)	r	r-CI	p- value
CN	V = -6.78×age+2279	2.16	125.93	-0.24	(-0.32,-0.17)	<0.001
GP	V = -7.66×age+2303	2.05	119.42	-0.29	(-0.36,-0.21)	<0.001
PUT	V = -18.8×age+4009	2.55	149.01	-0.51	(-0.56,-0.45)	<0.001
THA	V = -14.72×age+4423	3.77	220.42	-0.30	(-0.37,-0.22)	<0.001
PT	V = -6.89×age+963	0.88	51.16	-0.53	(-0.58,-0.47)	<0.001
RN	V = -1.08×age+247	0.25	14.36	-0.33	(-0.4,-0.26)	<0.001
SN	V = 2.14×age+367	0.64	37.39	0.26	(0.18,0.33)	<0.001
DN	V = 3.55×age+428	1.30	77.53	0.22	(0.14,0.3)	<0.001

21 *r*: Pearson correlation coefficient; *r*-CI: Confidence interval of *r*

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23 **Table S5.** Linear fitting equations for volume (V) (mm³) vs. age for RII Analysis.

	V=A×age+B	Error in A (mm³/year)	Error in B (mm³)	r	r-CI	p- value
CN	V=-0.48×age+438	1.31	76.51	-0.03	(-0.11,0.05)	0.47
GP	V=-2.64×age+390	1.17	67.98	-0.18	(-0.26,-0.1)	<0.001
PUT	V=-1.33×age+543	1.82	106.68	-0.06	(-0.14,0.02)	0.15
THA	V=-13.45×age+1997	2.46	143.80	-0.40	(-0.46,-0.33)	<0.001
PT	V=-0.39×age+108	0.66	37.38	-0.06	(-0.15,0.04)	0.24
RN	V=0.22×age+37	0.29	17.00	0.06	(-0.02,0.15)	0.14
SN	V=1.71×age+44	0.61	35.65	0.22	(0.15,0.3)	<0.001
DN	V=3.04×age+30	1.31	79.14	0.20	(0.11,0.28)	<0.001

24 *r*: Pearson correlation coefficient; *r*-CI: Confidence interval of *r*

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27 **Table S6.** Linear fitting equations for total iron (I) ($\text{ppb} \times \text{mm}^3$) versus age for the global analysis.

	I=A×age+B	Error in A (in ppb×mm³/year)	Error in B (ppb)	r	r-CI	p-value
CN	I=408.63×age+58384	162.41	9487.51	0.20	(0.12,0.27)	<0.001
GP	I=-890.54×age+277111	406.45	23742.05	-0.17	(-0.25,-0.09)	<0.001
PUT	I=531.96×age+123698	341.17	19928.81	0.12	(0.04,0.2)	<0.001
THA	I=-1400.84×age+58884	155.84	9102.44	-0.58	(-0.63,-0.53)	<0.001
PT	I=-330.82×age+39571	76.03	4436.17	-0.33	(-0.4,-0.26)	<0.001
RN	I=182.02×age+8691	44.86	2624.96	0.31	(0.23,0.38)	<0.001
SN	I=675.86×age+22358	147.96	8658.07	0.34	(0.27,0.41)	<0.001
DN	I=1075.62×age+-2236	225.04	13436.06	0.37	(0.3,0.44)	<0.001

28 *r*: Pearson correlation coefficient; *r*-CI: Confidence interval of *r*

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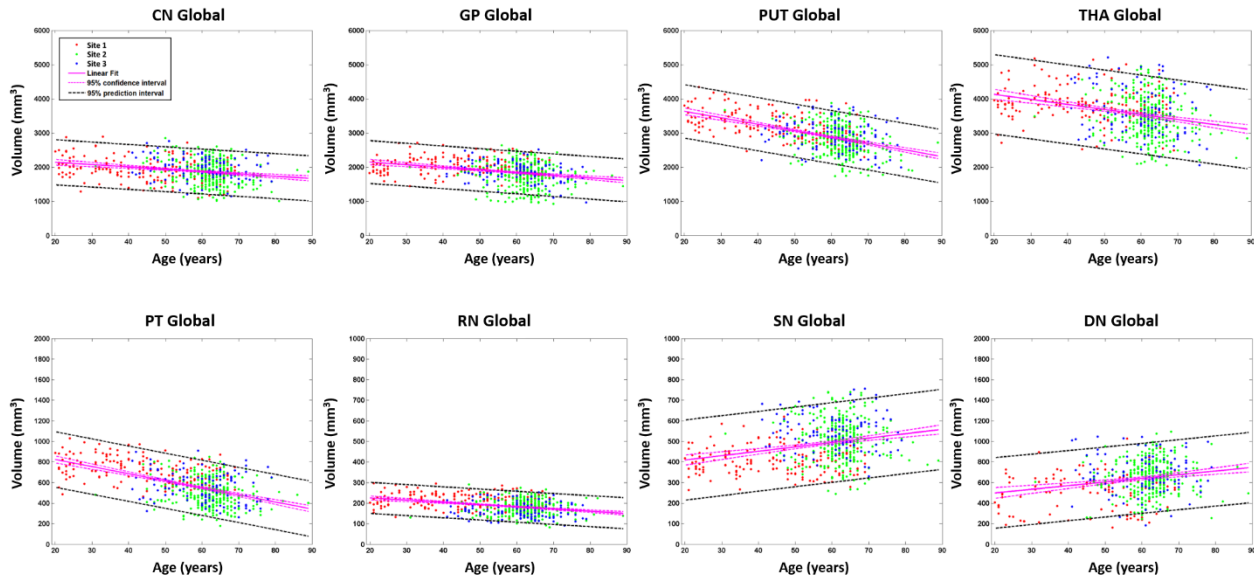
31 **Table S7.** Linear fitting equations for total iron (I) (ppb × mm³) versus age for the RII analysis.

	I=A×age+B	Error in A (ppb×mm³/ year)	Error in B (ppb)	r	r-CI	p-value
CN	I=302.16×age+22850	138.77	8095.83	0.17	(0.09,0.25)	<0.001
GP	I=-430.18×age+78979	281.71	16389.47	-0.13	(-0.21,-0.04)	<0.001
PUT	I=375.42×age+38454	250.61	14609.73	0.12	(0.04,0.2)	<0.001
THA	I=-510.21×age+64247	107.79	6293.19	-0.36	(-0.42,-0.28)	<0.001
PT	I=-12.9×age+7265	52.65	2989.73	-0.02	(-0.12,0.07)	0.63
RN	I=79.89×age+4110	54.28	3215.36	0.13	(0.04,0.21)	<0.001
SN	I=420.72×age+5531	136.88	8025.78	0.24	(0.17,0.32)	<0.001
DN	I=561.39×age+679	229.88	13894.25	0.21	(0.12,0.29)	<0.001

32 *r*: Pearson correlation coefficient; *r*-CI: Confidence interval of *r*

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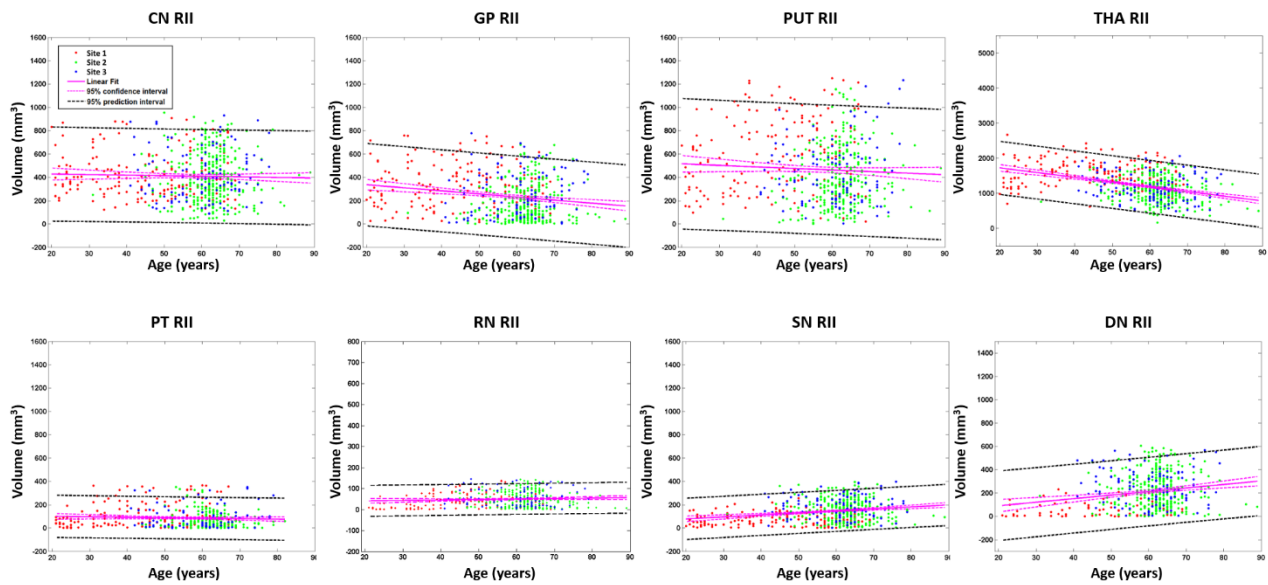
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36 **Figure S1. Volumes for the global analysis.** The volumes (the average of the bilateral nuclei) and
 37 95% confidence intervals and 95% prediction intervals are shown for each structure as a function of
 38 age. CN: caudate nucleus, GP: globus pallidus, PUT: putamen, THA: thalamus, PT: pulvinar
 39 thalamus, RN: red nucleus, SN: substantia nigra, DN: dentate nucleus.

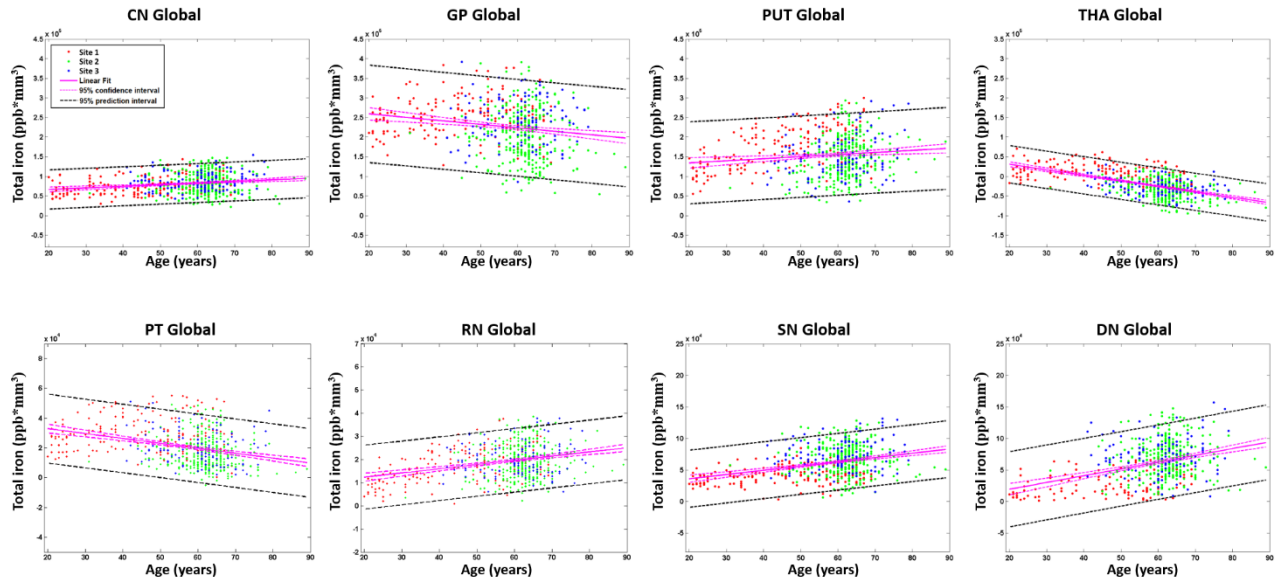
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42 **Figure S2. Volumes for the RII analysis.** The volumes (the average of the bilateral nucleus) and
 43 95% confidence intervals and 95% prediction intervals are shown for each structure as a function of
 44 age. CN: caudate nucleus, GP: globus pallidus, PUT: putamen, THA: thalamus, PT: pulvinar
 45 thalamus, RN: red nucleus, SN: substantia nigra, DN: dentate nucleus.

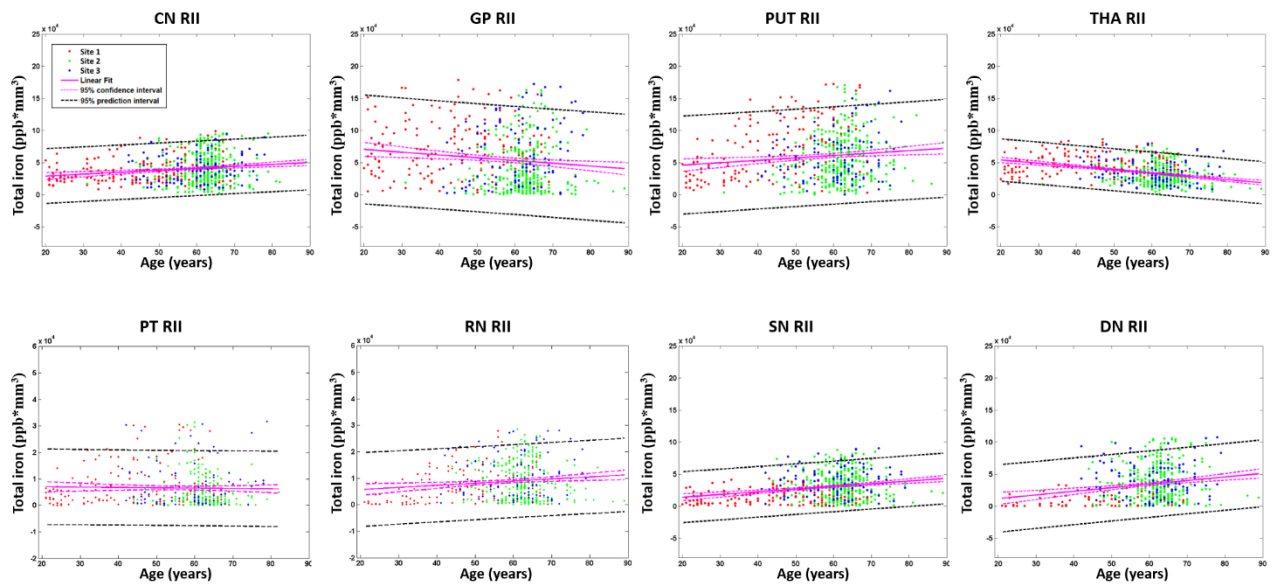
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48 **Figure S3. Total iron content (ppb×mm³) from the global analysis.** The iron and 95% confidence
 49 intervals and 95% prediction intervals are shown for each structure as a function of age. CN: caudate
 50 nucleus, GP: globus pallidus, PUT: putamen, THA: thalamus, PT: pulvinar thalamus, RN: red
 51 nucleus, SN: substantia nigra, DN: dentate nucleus.

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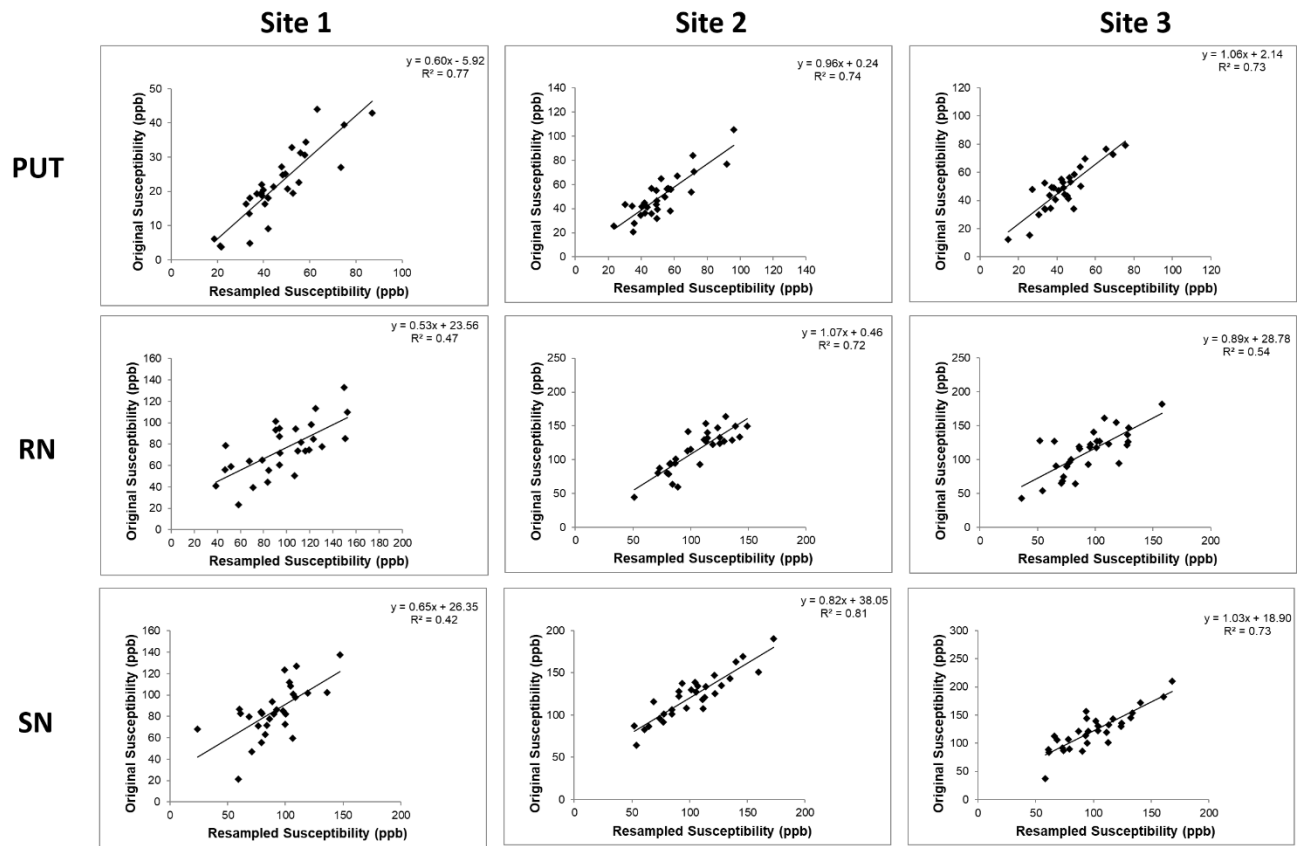


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54 **Figure S4. Total iron (ppb \times mm³) from the RII analysis.** The iron and 95% confidence intervals
 55 and 95% prediction intervals are shown for each structure as a function of age. CN: caudate nucleus,
 56 GP: globus pallidus, PUT: putamen, THA: thalamus, PT: pulvinar thalamus, RN: red nucleus,
 57 SN: substantia nigra, DN: dentate nucleus.

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61 **Figure S5. Comparison of the iron content of the PUT, RN, and SN between the k-space**
 62 **cropped lower resolution images and the original images. The ROI boundaries were redrawn in**
 63 **the resampled images but the partial volume effect was not taken into account.**